Geophysical Research Abstracts
Vol. 12, EGU2010-1208-1, 2010
EGU General Assembly 2010

The discharge front structure in coastal zone of the Laptev Sea in winter season

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In the Arctic region the discharge front is poor studied phenomenon, especially in cold season. We investigated thermohaline structure in the south-eastern part of the Laptev Sea (the Buor-Khaya Bay) where front has been forming under the ice cover. It is identified by strong horizontal temperature and salinity gradients. Front location and its dimension are under the influence of the Lena River discharge. The front dynamics resulted in specifics of vertical thermohaline structure, which is characterized by baroclinic and thermoclinic constituents. In a short distance from the river mouth the front is baroclinic (isotherms and isohalines remain parallel to each other). Another type of front (thermoclinic) is formed at the periphery of the front (isohalines intersect isotherms at an angle of up to 90°). The first mechanism of thermoclinicity is isopycnic convergence of river water in lower horizons because of its cooling near the ice. The second mechanism works at the periphery of the front, where horizontal stratification is weaken, and frontal convergence is resulted in isopycnic intrusions of cold water under the relatively warm fresh water. The intrusion's cross section in the Bay made about 50-85 km and thickness varied from 3-5 up to 15m depending on the Lena River discharge. The temperature of intrusions is lower than at bottom water. The interleaving cold and warm freshened water inside the intrusion is a result of double diffusion process. Water of the intrusion is enriched with dissolved oxygen and facilitates to ventilation of water in the coastal zone under the ice. The calculated heat content of bottom water testifies about its origin from the outer shelf of the Laptev Sea while the T-S characteristics of intrusion is close connected to the inner shelf.